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ABSTRACT

Through an examination of the technical and professional writing profession as it defines itself and through a citation analysis of its journals, this thesis highlights the literature, identifies access problems, and suggests some strategies for confronting bibliographic obstacles. After a brief introductory chapter, the second chapter of the thesis examines how the discipline defines itself through its professional associations, the characteristics of its practitioners, and its place in the univesity. The third chapter presents a citation analysis of the eight core journals published in 1990 and 1980 and reports that: (1) although academic programs in technical and professional communication are physically positioned in humanities units, the research literature resembles that of that of social science; (2) the interdisciplinary connections of this literature are to social science disciplines, with the exception of English and computer science; (3) the citations indicate that there are two distinct but not mutually exclusive subdisciplines, business communication and technical communication; and (4) there was a vast increase in the number of citations per article in all the journals. The fourth chapter of the thesis details general and specific problems of bibliographic control for a discipline thus defined, proposing some strategies for confronting bibliographic obstacles. Fourteen tables and six figures of data are included; 50 references are attached. (RS)

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THE LITERATURE OF TECHNICAL AND PROFESSIONAL COMMUNICATION: CITATION PATTERNS AND BIBLIOGRAPHIC CONTROL

BY

DONNELYN CURTIS, B.A., M.A.

A Thesis submitted to the Graduate School

in partial fulfillment of the requirements

for the Degree

Master of Arts

Major Subject: English

New Mexico State University

Las Cruces, New Mexico

May 1992

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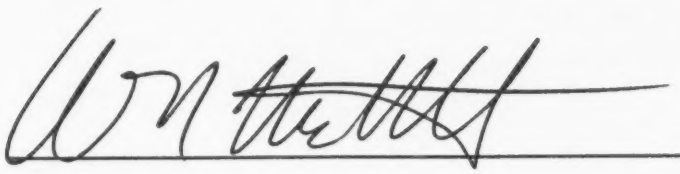

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As an evolving professional and a new academic discipline, technical and professional communication is undergoing a process of self-definition. During this process, it is important to consider the classification of the research literature so that it can be found and used by future researchers and students. The traditional organization of universities and of libraries creates certain problems in handling the literature of a new and interdisciplinary field such as this. Through an examination of the technical and professional writing profession as it defines itself and through a citation analysis of its journals, this thesis highlights the literature, identifies access problems, and suggests some strategies for confronting bibliographic obstacles.

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Chapter One

INTRODUCTION

New academic programs in technical and professional communication are proliferating at both the undergraduate and graduate levels. As these new programs emerge, students and faculty turn to university libraries to provide materials to support their coursework and research. Librarians are responsible for organizing these materials for later retrieval, and for understanding how other librarians, indexers and publishers have organized the materials.

When a new book about art, biology or history is cataloged, the librarian does not have much difficulty assigning a call number and subject headings using the Library of Congress Classification System. The book can then be shelved in its rightful location, and can be found using the access tools the library provides. However, when a new book about technical writing or professional communication is being cataloged, its rightful place within the classification system is not so apparent to the librarian. The classification system, modeled after the university of the 1800's, did not anticipate such books.

When literature, art, biology or history students come to the library seeking journal articles, librarians can easily direct them to the appropriate indexes, databases and bibliographies. However, when students of technical and professional communication come to the library looking for journal articles, librarians are uncertain where to direct them. The discipline is not large or established enough to have its own indexes, and none of the existing indexes is thorough in covering it. Furthermore, topics of interest to these students are diverse, the discipline is not clearly delineated, and the research base is not clearly defined. Some would disagree with the idea that technical and professional communication *is* a discipline.

The reasons for a lack of bibliographic control are many, and possible solutions are limited. In order for technical and professional communication students and

researchers to have better access to the published research in their field, the researchers, practitioners and teachers need to work together to define and establish a stable and consistent position within the academy, and to work with librarians and others to organize their literature within the existing system.

In order for change to take place, more communication is necessary between those who create the literature and those who provide access to it. Writers, researchers and teachers need to understand the traditional ways in which universities and libraries have been organized, and librarians and indexers need to understand the ways in which disciplines such as this one diverge from and connect with traditional disciplines. As the field evolves, a dialog must take place around its literature so that it doesn't get lost in the system or scattered too widely to be easily gathered. The discipline will evolve more quickly if researchers can build upon what has already been established by previous researchers.

In initiating a dialog around the literature of technical and professional communication, I plan to first look briefly at the discipline as it defines itself through its professional associations, the characteristics of its practitioners, and its place in the university. I will then take an empirical look at some of the research literature itself, discussing the results of a citation analysis of articles in core journals. The research defines the discipline just as the discipline defines the research. Finally, I will detail general and specific problems of bibliographic control for a discipline thus defined, proposing some strategies for confronting bibliographic obstacles.

Chapter Two

A PROFESSION SELF-DEFINED

Technical and professional communication is relatively new both as a profession and as an academic discipline. As both the profession and the discipline grow, symbiotically, they define each other. As workplace needs evolve, academic programs try to fill and anticipate the needs. At the same time, educators attempt to expand the role of technical communicators within industry and business.

History

In the past, technical writers and editors got most of their training on the job. However, technical writing courses have been available since the late 1800's in departments of engineering or in English departments for those technical people whose jobs would include writing. In his thorough history of technical writing instruction, Robert Connors identifies the pioneers of the specialized courses and their textbooks. In 1937, 76 of the 117 engineering schools in the United States together offered 93 different technical writing courses (p.338). The teachers of the courses were "literary scholars, and only the less talented of them gravitated to engineering English" (p.339). After World War II, the first technological war, technical writing courses expanded, as wartime technologies were adapted to peacetime uses. Technical writing became a job in itself, rather than an adjunct occupation. Returning veterans populated the classrooms.

During the 1950's, Connors continues, the profession matured. Professional associations developed, and in 1958 the first master's degree program was established at Rensselaer Polytechnic Institute. By this time, most technical writing programs were housed in English departments. During the 1960's, the profession became self-conscious, and teaching underwent a process of self examination. In most English departments, technical writing was considered a low-level service course, and was assigned to graduate assistants and college instructors, along with freshman composition courses. A serious drop in engineering students reduced the enrollment in technical writing classes.

Connors identifies 1970 as a turning point for technical writing instruction. A core of committed professionals had formed, "a growing number of teachers who considered technical communication their primary area of interest and expertise" (p. 347). In 1970, the *Journal of Technical Writing and Communication* was started. In 1974, course enrollment began to increase, due to the need for technical communications specialists in industry. At the same time, the demand for literature courses decreased.

For those majoring in business, there were (and are) courses in business writing located within business colleges. Technical writing and business writing disciplines developed separately, each with its own professional associations for academics and practitioners. Both have developed a knowledge base that goes beyond pedagogy to embrace communication theory, cognitive psychology, organizational theory, and information theory.

Technical and professional communication is a hybrid concept governing some academic programs and reflecting a transformed workplace in which the lines between "industry" and "business" are becoming blurred. The development of sophisticated software for handling text has freed the traditional technical writer from many of the traditional technical tasks, phasing out some jobs, as it were, and creating others. As Carolyn Miller sees it, the future of technical communication lies "with those who have a broad and diverse understanding of the relationship between communication and technology" (p.108). Technical communicators may have a range of duties beyond writing, duties that might include publication management, training, usability testing, and designing information products.

Professional Associations

Formal education is seen as a means to help professionalize the occupation, to upgrade practitioners' credentials and provide them with a theoretical framework and new skills. A professional association can gather information that will help define the educational needs of the profession. In shaping and reshaping academic programs, educators rely on information about what practitioners do in their jobs and what skills they use, as well as what skills they lack. The workplace is changing

dramatically within the changing global economy. The professional associations and their publications are helping their members to adapt and meet the new challenges.

In addition to supporting academic programs and credentials, other roles of a professional association are to upgrade the skills and the status of its members. Through continuing education workshops at conferences and through its publications, an association can help shape the future of a profession. The collective self image of the practitioners is seen to be a key element in raising the collective status within industry. In the literature of this profession there is frequent editorializing about what it means to be a technical communicator. This is especially evident in the journals intended for practitioners, published by the professional associations, *Technical Communication* published by the Society for Technical Communication (STC) and the *IEEE Transactions on Professional Communication* published by the Professional Communication Society of the Institute of Electrical and Electronics Engineers (IEEE /PCS).

In pointing out problems in the definition of composition studies, a more established closely-related field, Patrick Scott remarks that "An academic field is socially, not logically defined," by its professional associations, for example. A professional association gives social coherence and stability to a research paradigm. He notes that those scholars seriously working in the field of speech have identified with a single professional association, whereas composition faculty are hindered in the development of a consolidated research base by having a large number of overlapping professional associations (pp.172-3).

Technical communication faculty belong to some of the many English-oriented associations that Scott lists — the Conference on College Composition and Communication (CCCC), the National Council of Teachers of English (NCTE) College Section, the College English Association (CEA), the Rhetoric Society of America, the International Society for the History of Rhetoric, the Council of Writing Program Administrators, the Association of Departments of English (ADE), and the Modern Language Association (MLA). They also have a specialized association, the Association for Teachers of Technical Writing (ATTW). This association has 800 members and publishes the journal *Technical Communication Quarterly*, formerly *The Technical Writing Teacher*. Many technical communication faculty also belong to the IEEE

Professional Communication Society and/or the Society for Technical Communication, (STC) and some belong to the American Society for Training and Development (ASTD). The Association for Computing Machinery (ACM) also has a Special Interest Group on Systems Documentation (SIGDOC).

STC regularly surveys its members and compiles a statistical profile. This survey focuses on education, job satisfaction, salary, and type of job held. The 1988 survey showed that 32% of the members have degrees in English, while 13% have degrees in technical communication and 10% have degrees in journalism. The majority are writers and/or editors; only 12% are educators (Cook and Stolgis, p.41). However, STC is a relatively large association, claiming 12,000 members, so 12% represents 1,440 members who are educators, a larger group than the entire membership of ATTW, which numbers around 800.

The Association for Business Communication (ABC) also polls its members. Table 1 shows the breakdown of institutional affiliations as indicated by the mailing lists in 1968 (649 members) and in 1985 (1,654 members).

Table 1

Institutional Affiliations of ABC Members

	1968	*1985*
High School	3.2%	.4%
Junior College	1.4%	3.0%
4-yr. College/University	75.8%	67.0%
Technical School	—	.5%
Business	18.0%	9.0%
Other	2.0%	9.7%

(Darsey and Dorrell, p.3)

From 1968 to 1985, the members teaching in junior colleges increased dramatically, but overall the academic component has remained constant. Of those responding to the 1985 survey, 47% were affiliated with a college of business, whereas almost 25% were affiliated with an English department. Slightly more than 25% taught in other areas (communication, education, or "other"). The authors note that this is a major shift from the 1968 pattern. At that time, business administration was the department with which most of the teachers were affiliated, and business education was second (Darsey and Dorrell, p.4). This could reflect a transfer of some business writing courses to English departments, or an increase in crossover involvement among business writing and technical writing teachers. However, it should be noted that for compiling these percentages, in 1968 the entire membership (649) was polled, with a 475 response rate (73.2%). In 1985, a random sample of 165 members was selected, and only 55% (91) responded.

Practitioner Surveys

There have been a number of empirical attempts to define the group of practicing professional communicators. Surveys are the most common form of research. Heather Keeler, in her "Portrait of a Technical Communicator: A Bibliographic Review of Current Research" critiques several surveys of technical communication students, graduates and practitioners and analyzes the results (pp.42-47). She finds that "...the works are dominated by repetitive surveys and often narrow and unmethodical sampling techniques; research methodologies are sometimes not even explained" (p.46). Nevertheless, she reports that their conclusions are consistent with each other and with those of the academic researchers in the field. She compares the survey results to the models outlined by Paul Anderson in "What Technical and Scientific Communicators Do: A Comprehensive Model for Developing Academic Programs" and in "A Systematic Analysis of the Technical Communicator's Job: A Guide for Educators" by Marcus Green and Timothy Nolan.

As Keeler reports, Anderson's technical communicators "solve problems that involve the management and communication of specialized information, where that information is to be used for practical purposes" (Keeler, p. 41, Anderson p.163). Keeler identifies Green and Anderson's article as "a major article lending insight to

our profession" (p.43). They conclude that technical communicators at the entry level focus sharply on researching, writing and editing, but those above that level do a great deal of project management. Skills considered essential for all technical communicators are technical expertise or aptitude and proficiency in composition. Green and Anderson as well as several other researchers reviewed by Keeler emphasize that technical communicators are total communicators, with a need for strong interpersonal skills.

According to Keeler, "a general profile of the technical communicator does emerge from these disparate research efforts." She lists some frequently specified attributes:

> Technical communicators must be total communicators with good writing, speaking and human interaction skills. They must work collaboratively, as team players with other professionals, and they require project coordination skills that carry them through projects from initial planning to final production and evaluation. More important than specific technical expertise is a balance between a basic understanding of writing mechanics and a basic understanding of technical and engineering concepts (p.47).

Lauren Livo attempts to define the technical communication profession through an analysis of job titles listed for authors at the 35th International Technical Communication Conference. She found a great deal of variation among titles for jobs that were essentially similar. She concludes that

> This abundance of titles may indicate either of two things: It may indicate a healthy vitality within the profession, seen by the exploration and consolidation of positions held by people who align themselves with STC. Or it may expose confusion about the skills technical communicators bring to their work (p.55).

There may not be a consensus on what technical communicators do or should be called, but there seems to be a consensus that a broad-based but consistently applied definition would help the collective self image of practitioners and raise the status of the profession.

Essays Defining the Profession

Throughout the essays and editorials of these journals there is continuing definition, redefinition and discussion about the evolving role of the members of the profes-

sion. Readers are urged to see themselves as creative managers of information rather than technicians. Often these definitions are drawn from authors' personal experiences or observations rather than from empirical or ethnographic research. For example, Richard VanDeWeghe in his 1991 guest editorial in *Technical Communication* describes some tasks of a typical technical writer, and then extolls:

> This is not the work of a mere technical writer; it calls for special talents and knowledge that we find admirable in poets. That is not to say that writing technical documents and writing poems is the same thing, but only to say that the esteem accorded one group of imaginative writers belongs to the other as well. The problem is that technical communicators never think of themselves as creative writers, never accord themselves the esteem that is rightly theirs (p.298).

Frank Smith, the current editor of *Technical Communication*, frequently defines what it means to be a professional. In his editorial "The Challenges We Face" he suggests that in order to be widely recognized, a profession needs a clear-cut college curriculum, a body of literature that all practitioners are expected to know and use, and a cadre of researchers who devote their careers to advancing the state of knowledge in their fields (p.86). He feels that technical communication is currently lacking in these necessities. Furthermore, he feels that without a strong knowledge base built upon experimental findings rather than intuition and "so long as we add little or no demonstrable value to the products we produce...we will be regarded as laborers rather than professionals" (p.88).

The Research Base as a Defining Element

Is There a Research Base?

In his editorial "The Challenges We Face," Frank Smith in 1988 indicates that there is a serious lack of research literature in technical communication. "What do we have?" he asks, rhetorically, and then replies, "...two or three journals, a batch of elementary textbooks, and an almost irretrievable collection of conference proceedings" (p.86). Although no one could argue that the research base is large, the degree of Smith's dismissal should be questioned. There is a good possibility that Smith, in identifying so closely with STC, a basically non-academic association, is not aware of

the research literature invoked and codified by the more academic professional associations. The instructions for authors submitting work to his *Technical Communication* state:

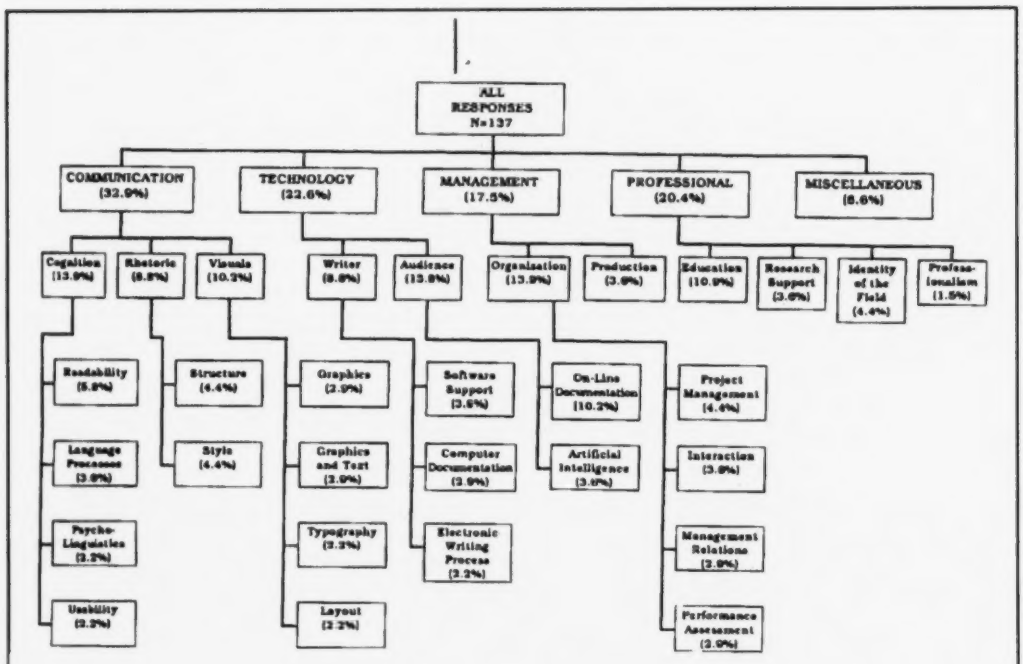
> ...please look over the literature in the field and cite any relevant publications, so that your article builds on and extends previous work, if there is any. For example, see previous issues of the journal, the *Proceedings* of the annual International Technical Communications Conference [STC's conference], the *IEEE Transactions on Professional Communication*, the *Journal of Technical Writing and Communication*, and appropriate textbooks.

Although these sources are listed as examples, it should probably be emphasized that there are other sources as well. I have identified eight core journals (see Chapter 3) and there are a number of other journals that publish research on technical and professional communication (Chapter 2). A number of books based on research have recently been published in this field. Retrievability is indeed an issue, as I will discuss in Chapter 3.

Connors, in 1982, wrote that "technical writing scholarship is thriving" (pp.348-9), but his is a historical perspective. The situation is changing, but compared to other academic disciplines, this discipline is still small and as yet poorly defined, the literature suffers from poor bibliographic control, and the researchers are not yet consolidated within the academic realm.

Research Examined

Despite the difficulties, there have been a few attempts to define research being done and needing to be done. John Beard, David Williams and Stephen Doheny-Farina developed a taxonomy of research needs articulated by practitioners and academicians. Their study concluded that "practitioners do value and use research" (p.193). Figure 1 shows the responses of 41 participants to an open-ended question about research areas needing investigation. There was an average of 3.7 responses per participant.



Taxonomy of Research Needs

Figure 1

(Beard, Williams and Doheny-Farina, p.191)

Mary Sue MacNealy studied the quantity and quality of research as reflected in the 1989 conference proceedings of the International Technical Communication Conference (STC) and the International Professional Communication Conference (IEEE /PCS). She used the Beard, Williams and Doheny-Farina taxonomy to classify the research, and found that some areas, such as communication and professional communication, received more than their share of research effort, while others, such as management did not. She also noted that there was little research on visuals. In general, she found that "systematic research in the field of technical communication is still in a limited stage of development" (p.197).

Academic Organization

In 1983, Paul Anderson, John Brockmann and Carolyn Miller, in their introduction to *New Essays in Technical and Scientific Communication*, wrote of "a general weakness of research in technical and scientific communication" (p.7), due to a historical scholarly bias against technical discourse and a more recent accident of the organization of the academy, as speech and English were dissociated.

This separation had two manifestations: the distinction between literary art and persuasive or functional discourse, on the one hand, and the distinction between written discourse and spoken discourse, on the other. What fell between the cracks was discourse that was both functional and written (p.8).

Technical communication, along with freshman composition, suffered. English departments unwillingly housed these programs, but "Without the promise of collegial support and academic prestige, then, technical and scientific communication has been hampered from developing a tradition of scholarly research" (Anderson, Brockmann and Miller, p.8).

In discussing the organization of the academy, one could also point out that issues in business communication are very similar to issues in technical communication, and yet the scholars are not even located in the same college. Most of the members of the Association for Business Communication teach in business colleges, and according to the 1985 ABC survey, most members regularly publish in academic journals. Only one in five listed "no publications," while 24.18% listed "over 10." 26.37% listed 1-2 publications, 8.79% had 3-4 publications, and 17.58% claimed 5-10 publications (Darsey and Dorrell, p.4). This would indicate that a pool of scholarly research of interest to technical communicators may not be included by those counting only the research of STC members (although there is some overlapping membership).

The type of academic institution and the department in which a researcher works will influence his or her research interests and directions. Because technical communication is a professional discipline, and because its existence in the academy is due to demands from industry, there is an applied as well as a theoretical research arena.

Sociology or physics departments differ little from university to university in their goals and objectives in teaching and research. However, technical communica-

tion programs may respond to local industry needs, and may be found in a specialized department such as the department of rhetoric (University of Minnesota) or in a very general department such as the department of humanities (Michigan Technological University). The University of Washington and University of Michigan programs are in the College of Engineering. Some of the most well-established programs (including some of the graduate programs) reside at technical institutions. The institutional research atmosphere will be much different than in a liberal arts college of a large university.

In the most recent official study of these academic programs, *Academic Programs in Technical Communication* by Patrick Kelley et. al, published in 1987 by STC, 45 bachelor and master's programs are listed in the departments shown in Table 2 (three are interdepartmental):

Table 2

Academic Departments of Technical Communication Programs

English	26
Humanities	5
Journalism	4
Humanities & Communications	2
Engineering	2
Technical Communication	1
Technical Journalism	1
Rhetoric	1
Industrial Communications	1
Physics & Life Sciences	1
Arts & Sciences	1
Industry & Technology	1
Language, Literature & Communication	1
Arts & Humanities	1

The names of the programs listed in the STC study reflect differences in philosophy and thus research directions. Of the 45 programs, 13 are called "technical writing" and 11are called "technical communication(s)." The others vary from "specialized journalism" to "industrial rhetoric." All program names are a combination of one or more modifiers and a noun from the lists in Table 3.

Table 3

Technical Communication Program Names

Modifiers		*Nouns*	
Technical	45	Writing	29
Professional	10	Communication(s)	24
Science/Scientific	8	Editing	4
Business	3	Journalism	4
Industrial	3	Media	1
Specialized	2	Specialist*	1
Expository	1	Organization**	1
		Rhetoric	1

* Writing and Editing Specialist

** Industrial Organization Program, Industrial Communication Department

This variety in the names of academic programs, like the variety in the job titles that await their graduates is further indication of the difficulty in defining this profession, its research, and its literature. It should be mentioned here that two new PhD programs, at New Mexico State University and Iowa State University, use the name "Rhetoric and Professional Communication" to define themselves. The fact that both programs align professional communication with rhetoric certainly strengthens that particular connection, and indicates a probable impact on the discipline as a whole.

Academic Coursework

The various institutional frameworks for technical and professional communication programs shape and generate research. The internal structures of the programs also influence academic researchers' interests and define research needs. As students explore topics beyond their textbooks, they identify voids. For their professors, some of these voids become research opportunities. Again, the research defines the profession and the profession defines the research.

In a study extending the STC report of academic programs, Marian Barchilon made it clear that there is a great deal of diversity among graduate programs, making it difficult to compare them. She raises questions about standardization and the definition of standards. She notes, "The questions about the role of education in the technical communication field are not answered easily, but they raise important issues and we should address them" (p.34).

There is a tension in the discipline between the need for standardization of academic programs and the need for programs that respond to specific or broad-based market demands.

Some would argue that programs should meet standards that would assure that all technical and professional communication graduates have a comparable baseline knowledge. Frank Smith feels that a clear-cut curriculum would enhance professionalism (p.86). Some feel that accreditation of academic programs would contribute to the status of the profession. The opinion is often expressed in the literature that some technical communication programs do a less-than-adequate job of preparing their students for present and future employment. For example, Gilbert Storms writes that some programs "aim to prepare students for the particular jobs that exist in their local area...Most aim to educate students for entry-level jobs" (p.13). Paul Anderson argues that differences in programs "represent a healthy diversity," while cautioning that "Some of the differences, however, result from a program's omitting an important course or requiring a questionable one" (Anderson, p.162).

Many of the articles about curriculum stress the changing nature of the profession, the range of job possibilities for technical communication graduates and the need for general models of education that provide principles and theory and the skills for problem solving and adaptation (see, for example Storms, Anderson, Gilbertson, Little, Miller, Treadwell, and Green and Nolan).

Regardless of the available models (real programs and theoretical constructs), program designers must respond to their local situations. The lack of professional standards makes it difficult to uphold ideals in the face of institutional pressure. In some cases, the university context demands a strong theoretical component; in other institutions, theory is considered inappropriate. Norbert Elliot and Margaret Kilduff stress that "As technical writing instructors, we cannot wrap ourselves in departmental isolation and cut ourselves off from the institutions in which we teach" (p.422).

Standardization of academic programs does not seem to be on the horizon. Recent literature gives the strong impression that programs will continue to evolve individually and variously, with some input from industry, interaction with the host institution, and help from the growing body of visionary and model-based literature. Students' needs and the local job market will also continue to shape the programs. Library resources and services to support these programs must also respond to the individual programs.

Conclusions

As a field, technical and professional communication is in the prime of self examination. At the same time, this analysis does not provide the structured definition that would allow its research literature to be identified and easily accessed.

In defining itself, this discipline has been both too limiting and too sweeping. In defining their profession in terms of its technology and tasks, some practitioners therefore define themselves as technicians. "Most practitioners," says Anderson, (p.162) "are largely unaware of the great diversity in their profession." Others, whose concern is the status of the profession with which they are involved, provide more refined but not always more useful models and metaphors. Charles Beck, for example, suggests the term "orchestrator" to define the technical communicator --

"Proposed definition: Technical communication is the process of orchestrating linguistic, visual, and auditory codes to accommodate information to the user" (p.14). VanDeWeghe encourages technical communicators to think of themselves as creative writers.

Weaving all these various definitions and points of view together gives an impressionistic view of the profession that is probably accurate. Most of those who attempt to define it (especially for the design of academic programs) emphasize the diversity of employment possibilites and job titles, the diversity of tasks in a given position, the changeability of the workplace, and the alluring prospects for the future. For a profession so closely linked to information technology, the definition should be ample enough to accommodate change. Technical and professional communicators should have the attitudes that allow them to create unique and appropriate positions for themselves as it becomes increasingly important to bridge the gap between sophisticated technology and its users.

However, in a changeable field it is exceedingly important to share information. This field, as it defines itself, does not allow for the usual search strategies for information retrieval. Being a new, small academic discipline means that the literature is still somewhat manageable, at least for the insiders. The community of researchers and scholars is small, the number of journals is browsable, and it is possible to distribute to students a short list of the important books and bibliographic articles. As the research base grows, though, it will be increasingly difficult to control bibliographically.

Chapter Three

PROFESSIONAL JOURNALS AS MIRRORS: A CITATION ANALYSIS

Bibliometrics is the quantitative study of a body of literature. Much of the research in the history and sociology of science has been bibliometric. Citation analysis is probably the best-known bibliometric method, first used more than 60 years ago to study the dissemination of scientific information, and applied more recently to disciplines in the social sciences and humanities.

Citation analysis is the study of lists of references in scholarly works. A citation is the converse of a reference; proper usage is "reference to" and "citation from" (L. Smith, p.83), but often in the literature the terms are used interchangeably.

References are intellectual linkages indicating relationships between one paper and another. Citation analysis can reveal networks among journals and fields, providing some information about the nature of a discipline.

> ...each citation is a public expression of a transaction where acknowledgment is exchanged for useful information...a network of ties between journals is generated by aggregating over the citations contained in journal articles" (Doreian, p.45).

The uses for citation analysis are varied. It is frequently used by sociologists or communications researchers to understand scholarly communication patterns within and across disciplines. Citation analysis can reveal major intellectual contributions within a field, or the influence of a particular journal or author. Or, "It can help to place the discipline in a group of subject fields sharing some common ground" (Budd, p.85).

Other uses (some might say misuses) of citation analysis are to help determine faculty salaries "as an indicator of quality of work (how much a person's research is being used by others)" (Garfield, p.3; see also Diamond), and to aid in reorganizing academic units (Reeves and Borgman, p.121). Librarians have used information from citation analyses to make decisions about central or branch libraries, to allocate budgets between serials and monographs, and to weed obsolete collections (Metz).

The appeal of citation analysis as a research method is its objectivity, its precision and its unobtrusiveness. As Linda Smith points out, "Citations are signposts left behind after information has been utilized and as such provide data by which one may build pictures of user behavior without ever confronting the user himself" (p.85). Computerized citation databases allow the quick manipulation of large quantities of citation data, and the annual *Journal Citation Reports* (*JCR*) give such measures as a journal's "impact factor," the "half life" of citations to a particular journal, the "immediacy" of citations (how quickly the journal is cited) and more.

Some drawbacks to citation analysis are that the citation databases and *JCR* can be used only for large journals and well-established, well-defined disciplines, and manual tabulation is laborious and painstaking. Although hundreds (perhaps thousands) of citation analyses have been published, there is a "lack of compatibility, which makes comparisons and synthesis difficult" (L. Smith, p.94). Methodological details can differ enough to render the data from another study useless for comparisons. Also, researchers seldom look at exactly the same aspects of the literature they are studying. Linda Smith's critique outlines many other weaknesses and pitfalls of citation analysis; she takes a harsh look at some of the false assumptions often made and the problems in data collection. She points out that

> Superficially, citation analysis appears to be a simple technique to apply, and there is a danger that it will fall into disrepute through uncritical or overenthusiastic use. As with any methodology, citation analysis produces results whose validity is highly sensitive to the skill with which it is applied.

Nevertheless, a careful citation analysis can provide some useful information about a discipline and its journals.

Methodology

I counted and charted all references attached to articles in technical and professional communication journals for 1990. I counted the number of unique references following each article and the number of articles in the journal, calculating the mean. In counting the number of articles, I did not count editorials or teaching exercises unless they included references, and I did not count regular columns or annotated bibliographies as articles. For historical context, I similarly calculated the citations

per article in the same journals for 1980. The *Journal of Technical Communication* was not published in 1980, and *Information Design Journal* for 1980 was not available locally.

Table 4

Technical and Professional Communication Journals

Journal Name, Publisher	Symbol	Established	Circulation	Issues in 1990	# of articles 1990	Citations 1990	Citations per article, 1990	Citations per article, 1980
Bulletin of the Association for Business Communication Association for Business Communication	BABC	1935	2475	4	40	552	**13.8**	2.8
Information Design Journal Information Design Journal, Ltd., England	ID	1979	700	2	14	231	**16.5**	not available
IEEE Transactions on Professional Communication IEEE Professional Communication Society	IEEE	1958	4300	4	27	451	**16.7**	2.2
Journal of Business Communication Association for Business Communication	JBC	1963	2475	4	20	765	**38.3**	8.7
Journal of Business & Technical Communication Iowa State University *	JBTC	1987	339	2**	8	219	**27.4**	not published
Journal of Technical Writing and Communication Baywood Press	JTWC	1971	1000	4	22	348	**15.8**	7.1
Technical Communication Society for Technical Communication	TC	1953	15000	4	37	381	**10.3**	7.1
Technical Writing Teacher *** Association of Teachers of Technical Writing	TWT	1973	800	3	19	389	**20.5**	6.9
Combined				27	187	3336	**17.8**	5.8

* Now published by Sage Press

** Now published 4 times a year

*** Now called *Technical Communication Quarterly*

I noted whether the references were to other journal articles, books, conference proceedings or other types of sources (and tabulated which types). If the reference was to a journal article, I noted the journal's subject field. If the cited journal's identity was not clear, I used the category assigned by *Ulrich's International Periodi-*

cals Directory. On a matrix chart, I tabulated the citations to other journals in the examined group.

If the reference was to a book, I noted whether it was to an entire book or to a chapter in an edited book. If the reference was to a conference paper, I noted whether it was in published proceedings.

Table 5

Types of Sources Cited in 1990 Journals

Cited formats	BABC	IEEE	ID	JBC	JBTC	JTWC	TC	TWT	Total
Journals	***50%***	***39%***	***36%***	***53%***	***40%***	***39%***	***44%***	***49%***	***46%***
	275	***177***	***82***	***404***	***88***	***136***	***168***	***190***	***1520***
Self-Cites	10	15	16	68	2	17	61	32	221
Other Core Journals	28	25		29	25	34	16	43	200
Other Journals	237	137	66	307	61	85	91	115	1099
Books/Chapters	***37%***	***50%***	***47%***	***39%***	***53%***	***49%***	***28%***	***44%***	***42%***
	204	***222***	***108***	***301***	***115***	***173***	***106***	***172***	***1401***
Books	173	161	84	243	83	129	69	112	1054
Chapters	31	61	24	58	32	44	37	60	347
Conference Papers	***4%***	***8%***	***3%***	***5%***	***2%***	***4%***	***21%***	***5%***	***6%***
	22	***37***	***8***	***37***	***5***	***9***	***79***	***20***	***217***
Published Papers	5	32	5	23	2	7	76	18	168
Unpublished Papers	17	5	3	14	5	2	3	2	51
All Other Sources	***9%***	***3%***	***14%***	***3%***	***5%***	***7%***	***7%***	***2%***	***6%***
	51	***15***	***33***	***23***	***11***	***30***	***28***	***7***	***198***
Dissertations/Theses	1		2	6	1	2		1	13
Govt. or UN Docs	3		2		1	1	4	3	14
ERIC Documents	3	1		3			1		8
Newspapers/Radio	14	2	1	1	7	3	6	1	35
Newsletters	5	3	1			12	2		23
Popular Magazines	12		1	2		1			16
Tech/Annual Repts.	6	5	17	3		7	6	1	45
Other	7	4	9	8	2	4	9	1	44
Total	***552***	***451***	***231***	***765***	***219***	***348***	***381***	***389***	***3336***

I was able to compare the results with the results of other studies, to examine the data using others' theories. I was also able to put bits of information back together and compile citation profiles of the individual journals.

Citations Per Article

The simplest and most straightforward citation measurement is the average number of citations per article in the journals under investigation. Most citation studies include the citation-per-article measure. Tabulation methodology differs little, but what can vary is the meaning or importance attached to the measure.

Derek deSolla Price, one of the founders of bibliometrics, contends that the citation count is a rough indication of an article's "scholarliness" (Price, 1970). He also believes that this measure "is determined by the size of available archive of literature in that field" (Price, 1980, p. 198). Clement So suggests that the citation count "can give us a sense of whether a journal is theoretical or applied in nature" (So, p.242).

Figure 2 shows that the average number of citations per article published in 1990 technical communication journals was 17.84. The citation averages for articles in individual journals ranged from 38.3 (*Journal of Business Communication*) to 10.3 (*Technical Communication*).

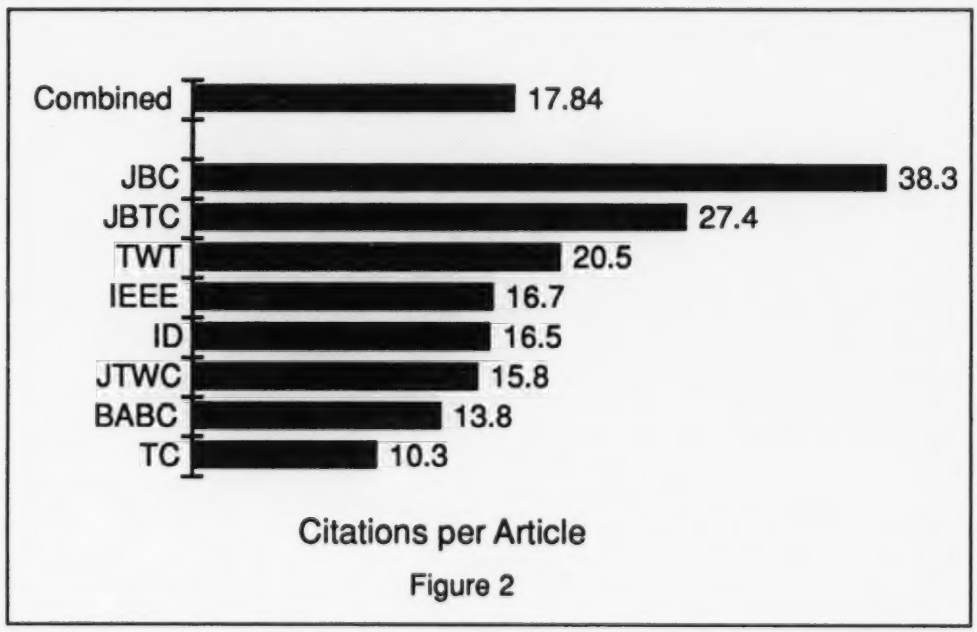


Figure 2

Although primarily a student of the literature of science, Price estimates that the average number of citations per article in social sciences journals was 11 (1980, p.198). Recent studies have shown his estimate to be low. According to John Budd, in 1986, the average number of citations per article with citations in all social sciences journals, based on data available in the *Social Sciences Citation Index,* was 15.6. (Budd, p.86).

In his study of the journals of higher education, Budd found the average number of citations per article to be 25.17 (p. 86). James Baughman found 24.96 citations per article in his study of sociology journals (p.295).

Clement So combined the 10 communication journals he studied into a single "macro journal" and compared it with "macro journals" of some neighboring fields (for each field, the top ten in "overall impact" journals, according to *JCR*).

Table 6

Citations per Article, "Macro Journals"

Discipline	*citations per article*
Anthropology	46.8
Political Science	43.5
Psychology	34.8
Sociology	30.1
Business	30.1
Language	29.9
Psychiatry	28.0
Communication	26.6
Education	21.5
Economics	19.9
Information Science	15.1

(So, pp. 244-248)

Technical and professional communication, with 17.8 citations per article, would fall toward the low end of this somewhat limited measure of scholarliness.

Because each field has its own communication traditions and information needs, and because by their nature some fields include an applied element and others are purely theoretical, it is perhaps not as useful to compare one field to others as to watch the citation count in a journal or group of journals over time.

To So, it was significant that the average number of citations in the 1983-85 communications journal articles he studied was higher than the same count in a similar study conducted by Reeves and Borgman of 1977-79 journals. In the earlier study, the average number of citations per article was 23.6. In So's study, the number had increased to 28.8. He felt that the increase was due to a literature build-up and a better theoretical development in the discipline (pp. 242-43).

An increase in the average citation count in a journal or group of journals can reflect a change in the focus of that journal or in the nature of the discipline. In 1980, the average number of citations per article in technical and professional communication journals was 5.8 compared with 17.8 articles in 1990 (see Table 4). This dramatic increase would indicate that the entire discipline has taken a turn towards theory and scholarly research during the eighties. This is supported by the multiplication of academic programs during that period (Kelley, et al).

Journals and Monographs

Another fairly simple (although manual and tedious) citation count is of the type of literature referenced. I have classified citations by their type in four major categories: books, journals, conference papers, and "other." These general categories are subdivided into more specific categories, such as published or unpublished conference papers, books or chapters of books, and more specific other sources (newspapers, dissertations, etc.). The references to journal articles are classified according to whether they cite the same journal, other technical communication journals, or journals from other disciplines.

Many of the other recent citation analyses use ISI's *Journal Citation Reports* (*JCR*). These are annual compilations of the data from *Science Citation Index, Social Science Citation Index* and *Arts and Humanities Citation Index* in a matrix format that shows which journals cite which other journals, along with totals, analysis, and various measures. The *JCR* data does not allow researchers to differentiate among types of literature cited, because only journal-to-journal references are considered.

However, in *earlier* studies, the type of literature cited was considered important in gauging the maturity of a discipline and the degree of consensus within the discipline. For example, Sydney Pierce (p.159) used such information to theorize that "The tendency of professional literatures [as opposed to `scientific' literatures] to cite nonjournal publications may therefore be both symptom and cause of an underlying lack of consensus in the field." The journal/monograph ratio has been used to compare disciplines to one another and to place them along a continuum of "hard" to "soft" science (see, for example, Price, 1970, Budd, p.87, Broadus, 1953, p.31, and the many references to Devin and Kellogg's Table 3, pp. 51-52).

Scholars in the fields of rhetoric, information science and sociology have been using this kind of information to support theories about the sociology of science, the invisible college, and differences among disciplines, as well as to understand patterns of information dispersal within disciplines. But there are also practical considerations.

Implications for Libraries

Recently, Robin Devin and Martha Kellogg have rekindled the library profession's interest in some of the old citation studies that quantified the journal/monograph ratio of citations in various fields. These acquisitions librarians urge their colleagues to examine academic disciplines in light of their citation patterns in order to construct formulas for the allocation of a library's materials budget. They suggest that "the serial/monograph ratio should be based on the use of the literature by researchers in that subject area as determined by citation studies" (p. 54).

Although most of the available serial/monograph citation data originates from the pre-*JCR* era of manual tabulation, it confirms common knowledge and the obser-

vations of Price, Pierce and many others that scholars in science rely heavily on journal literature, whereas those in the humanities cite books much more frequently.

Devin and Kellogg's table lists the results of 66 citation analyses. They emphasize the consistency of their data, commenting that "in certain subject areas this type of citation analysis has been conducted by numerous researchers over a substantial time span with similar results" (p. 52). Distilled, their data reflects the average percentage of the citations that are serials in the humanities, social sciences, and sciences:

Humanities:	26.3%
Social Sciences:	40.3%
Science & Technology:	82.6%

Budd also listed serial/monograph ratios as determined by various citation studies, including two of his own:

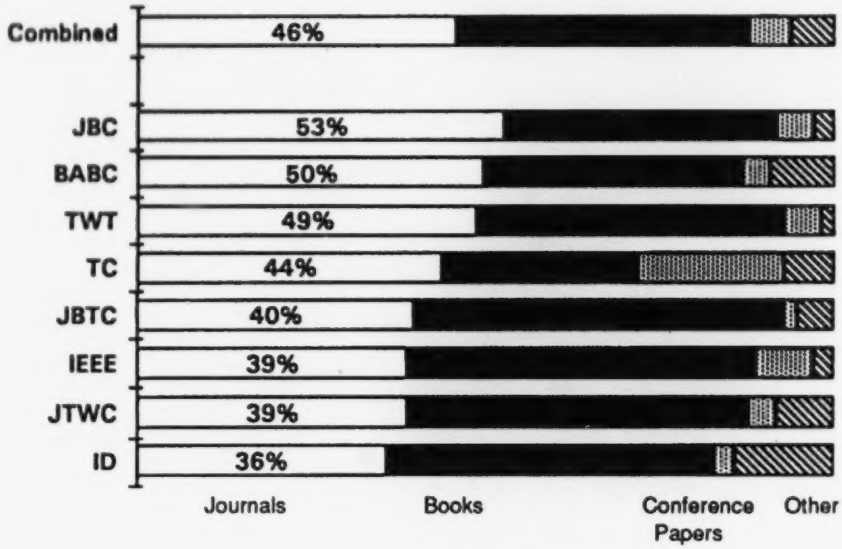
Table 7

Citations to Serials

Study	*Serials*
Humanities	
English Literature	19.9%
American Literature	23.0%
American Studies	28.8%
Social Sciences	
Sociology	38.5%
Higher Education	45.7%
Science	
Geology	75.7%
Microbiology	90.4%

(Budd, p. 87)

The journals of technical communication, citing journals at a rate of 45.6%, clearly follow the social sciences pattern in this measure, despite the fact that the academic programs are often located in humanities departments and college and university teachers in the field often have a humanities background, and practitioners often work in scientific environments. If a library is using a formula based on usage, it should maintain an equilibrium between books and journals for this discipline.



Types of Sources Cited

Figure 3

Book Chapters and Conference Papers

Classification of citations by type also allows us to speculate about the behavior of authors in obtaining their information, and to identify possible difficulties for other scholars in accessing it. For example, 346 or 10.4% of the references in this study are to chapters in books, most of which are edited collections of papers by individual authors. Another 217 (6.5%) of the citations are to conference papers. Fifty one of the conference papers (1.6% of the total citations) are unpublished, and therefore unavailable, except perhaps from the paper's author.

A student searching by subject using library catalogs and indexes to locate sources of information on a technical or professional communication topic would not be able to access book chapters or published conference papers. The subject headings that are applied to such books or conference proceedings must be broad enough to apply to all chapters, varied and specific though their subjects might be. Thus, an important research paper on collaborative writing in the workplace might be in a book that is classified by the Library of Congress (and therefore, by most other libraries) under the general subject heading "Technical Writing," along with several hundred other books in each library with the same heading.

The authors who cite these papers that are tucked away in edited books probably become aware of them through colleagues, publishers' flyers, or through references in other papers. Teachers and librarians should be aware that researchers, collectively, value the information in these edited books and conference proceedings, and that others, in order to find it, should use the lists of references in journal articles they have found. In this discipline, students need to learn early the tracking skills that most researchers use, following trails from an initial hit. Bibliographers should make an effort to include these chapters and conference papers in their subject-classified bibliographies.

Core Journals

Another measure used by citation analysts to devise theories and to guide library acquisitions is the frequency with which specific journals in a discipline are cited in related journals. Highly cited journals within a discipline are referred to as *core journals*. "Core journals can be defined as `that central set of journals which most clearly reflects the conceptual essence of the research being reported in the discipline"' (Summers, p.332).

A simple count of the number of citations given and received has certain drawbacks. "It disadvantages small journals in relation to large journals, newer ones relative to older ones, and infrequently issued journals relative to frequently issued ones" (Doreian, p. 47, citing Eugene Garfield of ISI). Garfield's *JCR* uses a measure he calls the "impact factor," a size-corrected index. However, for very large, very small, amorphous or new disciplines, the *JCR* impact list cannot be used.

The identification of core journals using citation analysis can be complex. Sometimes the core journals will be identified through an iteration process that begins with all journals cited in a discipline's leading journal, or in papers presented at a certain conference. "No consensus exists as to the best method of selecting starting journals" (Summers p.334). The citations of highly cited journals are then examined, and the process continues until a core list is apparent. Although *JCR* data has some limitations, it can be used for these studies in large or amorphous disciplines, but not for small or new ones.

The identification of the discipline's core journals is the sole purpose of some citation studies. In a discipline with many journals, researchers want to know which ones are most highly cited. In smaller disciplines such as technical and professional communication, there are so few journals that it is not difficult to identify a list of probable core journals. My original list of ten core journals was suggested by faculty teaching graduate courses in technical and professional communication at New Mexico State University. In addition to the journals listed in Table 4, my original list included *Written Communication* and *Visible Language*.

Only two of the technical communication journals that I was considering were listed in the *JCR*. These were *Written Communication*, listed as an English journal, and *The Journal of Technical Writing and Communication*, listed in the communication category. It was obvious that identifying the core journals of technical communication would be a manual process.

One of the suggested journals, *Visible Language*, was questionable. The subject matter of the 1990 articles did not appear to relate to technical communication, so I dropped it from the study. As I discovered, it was not cited in any of the articles in the other journals. I was unsure about *Written Communication*.

I found that there were no additional frequently cited journals that I could consider technical communication journals, although two English journals, *College Composition and Communication,* and *College English* were cited more often than one of the suggested journals, *Written Communication*. Because *Written Communication* had only two citations to the other core journals, and because all three journals deal with a subject area that is broader than technical communication, I dropped *Written Communication* from the list.

Table 8 is a matrix representing citations among the core journals. Note that the total number of citations to all of these journals comprises only 11% of the total number of citations. *Technical Communication* and *Technical Writing Teacher* authors had 21% and 20% of their citations to the core journals respectively, but in both cases there was a relatively high number of citations to the journal in which the author was publishing ("self citations" are in bold type). Authors in *Information Design* did not cite any of the other core journals. On the basis of this one measure, *Information Design* would not be considered a member of the set of core journals.

Table 8

Core Journals

Citing Journals / Cited Journals	BABC	IEEE	ID	JBC	JBTC	JTWC	TC	TWT	Total
Bulletin of the ABC	**10**	1		20	1		1	1	34
IEEE Trans.on Tech. Comm.	3	**15**			1	15	5	8	47
Information Design		1	**16**		1			5	23
Journal of Business Comm.	12			**68**	7	4		7	98
J. of Bus. & Tech. Comm.	7	4		1	**2**	2		3	19
J. of Tech. Writing & Comm.	1	5		3	10	**17**	7	14	57
Technical Communication	4	13		3	1	4	**61**	5	91
Technical Writing Teacher	1	1		2	4	9	3	**32**	52
Total citations to core	38	40	16	97	27	51	77	75	421
Percentage of total citations	8%	7%	7%	13%	13%	15%	21%	20%	11%
Total number of citations	552	451	231	765	219	348	381	389	3336

Subdisciplines

Citation studies of core journals will sometimes reveal subdisciplines. In a more developed field, there might be a division of labor among the journals, focusing on areas of research. A few dominant journals would take care of the basic issues on a general level. This elite group of journals would publish articles considered influential to the field at large. (So, p. 251).

So's study of communication journals agreed with Reeves and Borgman's study in distinguishing two very distinct subdisciplines, mass communication and interpersonal communication. Most of the journals in these subcategories do not cite each other, although one did bridge both of the subdisciplines.

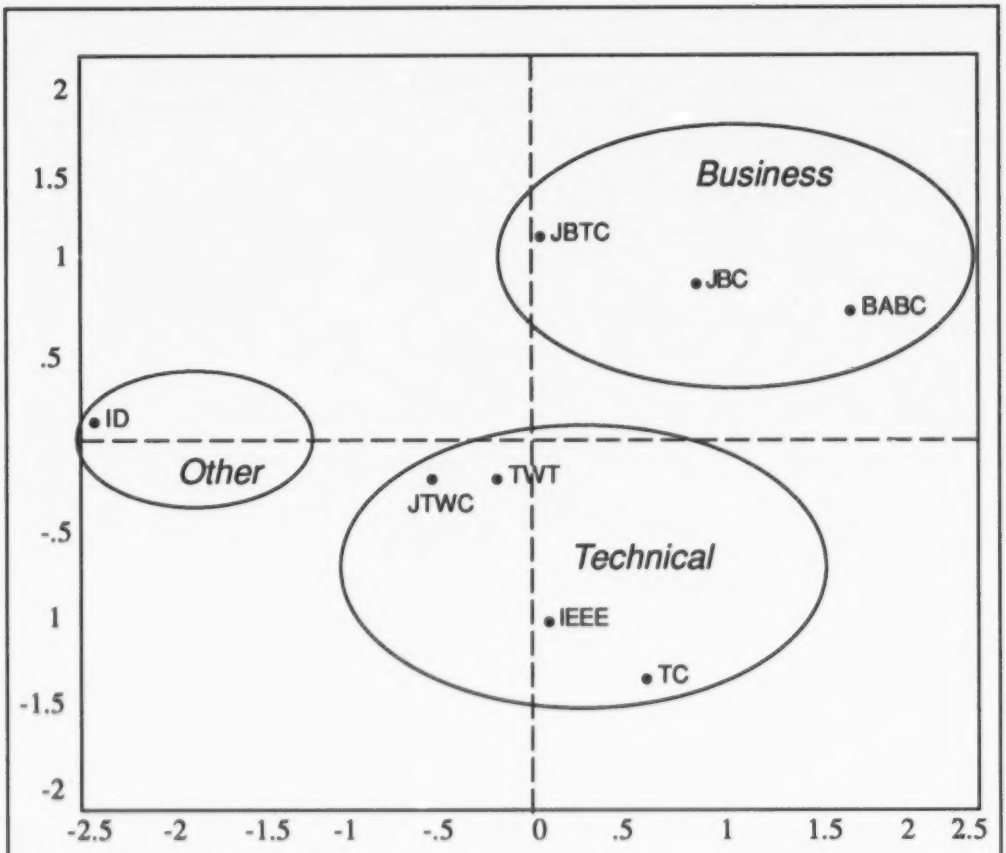
In his citation analysis, Jin Choi found that the subdisciplines in anthropology are mutually isolated. He interpreted this with alarm, noting a "lack of accumulation of theoretical knowledge that can hold subfields together and call upon intellectual leadership among anthropologists to synthesize, to bridge the gap among subdisciplines, in order to ensure true scientific progress" (p. 82-23).

Others are more optimistic about evidence that disciplines are branching out. In his study of reading research journal literature, Edward Summers attempted to identify "those with close citation linkages from cognate specialty areas, thus providing a picture of the cross-disciplinary involvement of the field" (Summers, p.332). He felt that infusion from the outside was healthy.

Keeping in mind that the numbers in my matrix are small, I ran the data through a multidimensional scaling analysis (ALSCAL on SPSSX) to map the interrelationships of these journals based on their citations to each other. The resulting map (Figure 4) shows two main clusters of journals.

Business/Technical Communication Clusters

In the upper right quadrant of the chart are three journals with the word "business" in their titles. On the lower section of the chart are three journals with the word "technical" in their titles and the IEEE journal (*professional* communication, but from



Journal name	Symbol	Dimension 1	2
Bull. of the Assoc. for Business Communication	BABC	1.700	.774
IEEE Transactions on Prof. Communication	IEEE	.112	-1.030
Information Design	ID	-2.400	.122
Journal of Business Communication	JBC	.773	.813
Journal of Business & Technical Communication	JBTC	.051	1.252
Journal of Technical Writing & Communication	JTWC	-.604	-.302
Technical Communication	TC	.617	-1.365
Technical Writing Teacher	TWT	-.249	-.264

Analysis of Citation Patterns Among Core Journals
Using Multidimensional Scaling

Figure 4

an engineering society). Although the title of the *Journal of Business & Technical Communication* includes both the words "technical" and "business," its co-citation patterns identify it more closely with the business communication journals. *Information Design* was not allied with either group, citing only itself.

While the data is admittedly limited, this map would indicate that there are two subdisciplines represented by these core journals, "business communication" and "technical communication." The Library of Congress and *Ulrich's* classification of these journals as well as their association affiliations (Table 4) confirms this analysis.

Table 9

Journal Affiliations

Journal	*Editor's Academic Dept.*	*LC#*	*LC Subject*	*Ulrich's Subject Category*
BABC	English	HF5718	Economics	Bus./Econ.
IEEE	English	T10.5	Technology	Elec. Eng.
ID	Typography/ Graphic Design	NK1520	Applied Arts	Lib./Info. Science
JBC	Mgt.Sci.& Stats	HF5718	Economics	Bus./Econ.
JBTC	English	HF5718	Economics	not listed
JTWC	Language, Lit & Communication	T11	Technology	Education
TC	Self employed	T11	Technology	Communic.
TWT	Rhetoric	T11	Technology	Education

The journals themselves are not unaware of this split. The *Journal of Business and Technical Communication* explains its role: "...*JBTC* offers opportunities for

bridging dichotomies that have traditionally existed in professional-communication journals between business and technical communication and between industrial and academic audiences."

The authors of the 1990 articles in *JBTC* do cite each of the other core technical and professional communication journals. The largest number of citations to a core journal is to the *Journal of Technical Writing and Communication*. The reason that it is mapped in the "Business" cluster is that the journals are linked as they cite the other journals and as they are cited. *JBTC* is most frequently cited by the *Bulletin of the ABC*. Perhaps business communication scholars are more aware of this journal than are technical communication scholars. However, it must be emphasized that this study is very limited in scope, and that there is not a great amount of co-citing among any of these core journals.

Openness/Centrifugality

Some (but, unfortunately, not many) citation analysts have examined a discipline's citation-to-core-journals/citations-to-other-discipline-journals ratio. To some theorists, this measure would indicate the degree of a discipline's "maturity." Metz (p. 155) states that disciplines with mature research paradigms "will be more focused in their work and will tend more to cite works from within their own literatures."

Others see this focus in a different light. Bracken and Tucker (p. 666) feel that "self citation has been largely interpreted as indicating the insularity of library science." Pierce, in his study of the qualities of professional literatures, also used the term "insular" to refer to the lack of outside influences (p. 160). Interpretation of this measure will vary among researchers. Setting value judgments aside, this ratio allows us to quantify a discipline's self-sufficiency or interdisciplinarity.

Choi and So have independently devised related formulas to quantify their disciplines' "openness" to outside influences (So, p. 242) or "centrifugality" (Choi, p. 69). Basically, they divide the number of citations to journals of other disciplines by the total number of citations to journals. Quantifying this characteristic allows us to compare journals with each other and with disciplines for which we have data. Table 10 shows how frequently authors in the eight technical and professional communica-

tion journals cite the journal in which their article is published, other journals in the discipline, and journals from other disciplines.

Table 10

Openness

	Citations to self	Citations to own field	Citations to other fields
BABC	4%	10%	86%
IEEE	8%	14%	78%
ID	20%	0	80%
JBC	17%	7%	76%
JBTC	2%	28%	69%
JTWC	13%	25%	62%
TC	36%	10%	54%
TWT	17%	22%	61%
Combined	14%	13%	73%

Table 11 shows how technical and professional communication journals, taken as a whole, compare with the journals of other related disciplines in their citation of journal literature from outside their disciplines.

Table 11

Citations to Journals from Other Disciplines

Communication Studies (So, 1988)	85%
Technical & Professional Communication	**72%**
Anthropology (Choi, 1988)	67.5%
Sociology (Broadus, 1967)	57.2%
Higher Education (Budd, 1990)	48%
Education (Broadus, 1965)	43.7%
Library Science (various, in Bracken & Tucker, 1989)	22-42%

Again, watching the changes over a period of time may prove to be more useful than comparing disciplines to one another. Both So and Choi were able to make historical comparisons to their findings. The centrifugal tendency of anthropology increased slightly, from 66.7% in 1963 to 67.5% in 1983 (Choi, p.78), while communication's openness to other fields decreased from 87% in 1977-79 to 85% in 1983-85 (So, p.241). Interpretation of changes will also be subjective.

Looking at the differences between professional and scientific literature, Pierce found that "Focused on their own problems, [professionals] tend also to draw on a much narrower range of subject literatures. Compared to researchers in the sciences, researchers in the professions tend to draw a greater proportion of the materials they cite from their own field." (p. 160).

Bracken and Tucker have documented that this is indeed true of library science. However, it does not appear to be the case in technical and professional communication. This professional discipline seems to be very open to the literature of other disciplines. The converse is that it does not appear to have its own research base.

Subject Relationships

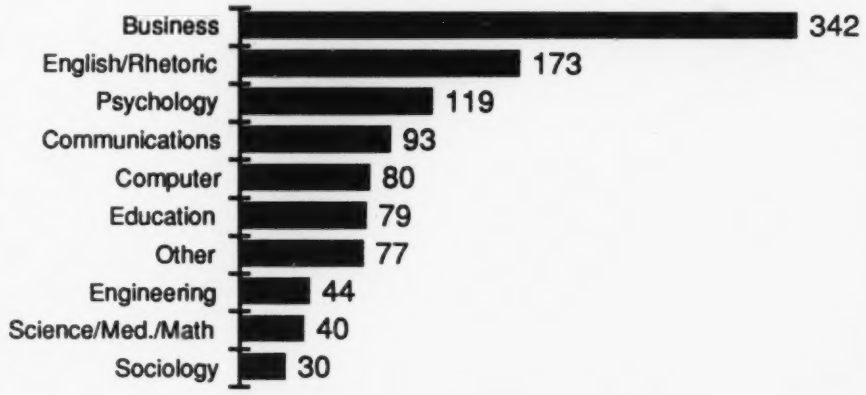
After determining that a discipline is "open," or "centrifugal," or "immature " or "interdisciplinary" or "cross-fertilized," the next job for its scrutinizer is to analyze which other disciplines are most often cited, and perhaps to speculate why.

Figure 5 and Table 12 illustrate that business journals are cited twice as often (342 citations) as journals from the next-most-cited discipline, English (173 citations). This is somewhat surprising. Several of the English journals are cited numerous times (see Table 13), but this does not appear to be the case with business journals.

The Bulletin of the ABC and the *Journal of Business Communication*, both published by the Association for Business Communication, account for the majority of the citations to business journals. The focus of *JBC*, stated in the journal itself, is on "business, managerial, or organizational communication theory or knowledge."

In these two journals, the references to business journals are seldom to articles about business communication per se, but are often about organizational theory, corporate culture, managerial and marketing trends. Psychology and communications journals are also cited in these journals more frequently than in the other core jour-

nals. When pedagogy is discussed, references are often to specialized business education journals rather than to the English education journals often referenced by authors in the other core journals.



Subject Focus of Journals Cited in Technical Communication Articles

Figure 5

The references to English journals are scattered through all the journals. Only the *Technical Writing Teacher*, the *Journal of Business and Technical Communication* and the *Journal of Technical Writing and Communication* cites English journals more often than business journals. It should be noted that the *Journal of Business and Technical Communication* has more references to communications journals than to either business or English journals.

Psychology journals are also cited several times in all the journals except *The Technical Writing Teacher*, which has only one citation to this category. Seventy nine of the 119 psychology articles are cited in the two ABC journals. Many of the psychology journals cited in *The Bulletin of the ABC* and *The Journal of Business Communication* represent a business subdiscipline of psychology -- organizational psychology, personnel psychology and marketing psychology. Some of the psychology journals cited in the other technical and professional communication journals have to do with cognitive psychology and human factors.

Table 12
Subject Focus of Cited Journals

Citing Journals / JournalsCited	BABC	ID	IEEE	JBC	JBTC	JTWC	TC	TWT	Total
Business	110	4	20	142	8	4	34	20	342
English/Rhetoric	30	1	15	27	12	27	4	43	173
Psychology	25	7	17	47	9	10	3	1	119
Communications	22	5	1	44	15	2	1	3	93
Computer	13	1	33		1	6	21	5	80
Education	22	9	14	8	4	7	4	11	79
Engineering	1	12	12		1	1	8	9	44
Science/Med./Math	3	8	9	1		12	7		40
Sociology	1		2	21	1	1		4	30
Other	3		4	6	3	1	1	4	22
Art		4			3		2	9	18
Linguistics	1	2	4	1	1	2		1	12
Journalism				1	1	4		2	8
Philosophy/Religion		2		3		2		1	8
Statistics		6	1			1			8
Govt./Pol.Sci/Econ		3		3			1		7
Non-core Tech. Comm.		1			2	2			5
History						3		1	4
Library/Information Sci.	1		1				1		3
Arch./Construction	2								2
Law			1	1					2

The Bulletin of the ABC and *The Journal of Business Communication* also account for the majority of the communications articles cited. The *IEEE Transactions on Professional Communication* and *Technical Communication* cites computer science journals heavily, accounting for 54 of the 80 references.

Considering that education is the focus of many of the articles in this study and that at least one of the journals is devoted entirely to the subject, it is surprising that education journals are not cited more frequently than they are. Perhaps more surprising is the almost total lack of references to information science journals. The overlap-

Table 13
Cited English Journals

Cited In: / Cited English Journals	BABC	IEEE	ID	JBC	JBTC	JTWC	TC	TWT	Total
College Comp. & Comm.	10	4		5	2	12	3	16	52
College English	12	8		9	3	4	1	13	50
Written Communication	4	3		2	2		2	1	14
Res. in the Teach. of Eng.	1	1			3	3		1	9
English Journal	1			3	1			1	6
Rhetoric Review	3			1		1			5
Jrnl. of Advanced Comp.	1			2		2			5
Writing Program Admin.	1							2	3
Journal of Reading				2				1	3
Writing Center Journal				1				1	2
Teach. Eng. in 2 yr. Coll.								2	2
PMLA						2			2
Philosophy & Rhetoric								2	2
Language & Style					2				2
Chaucer Review						2			2
Yale Review				1					1
Writing Lab. Newsletter								1	1
Word Study					1				1
Rhetoric Soc. Quart.								1	1
Poetics Today								1	1
New Literary History				1					1
Modern Language Rev.		1							1
Modern Language Notes		1							1
Jrnl. of Basic Writing								1	1
Eng. for Spec. Purposes				1					1
Discourse Processes			1						1
Computers & Comp.	1								1
American Scholar				1					1
ADE Bulletin						1			1
Total	34	18	1	29	14	27	6	44	173

ping of research interests in these two fields that have a common overriding mission to make information accessible has apparently been overlooked by technical and professional communication scholars. Journalism literature may also be an overlooked resource for these authors.

Journal Profiles

The above citation data can be used to round out profiles of individual journals. Each journal defines itself at at the beginning of each issue and in its instructions to authors. Directories such as *Ulrich's International Periodicals Directory* and the *Standard Periodicals Directory* also briefly describe journals. But no one has yet characterized these particular journals or compared them with each other based on the literature their authors consider important.

In defining a journal in this way, though, we must keep in mind that we are examining only the references for one year in the lives of these changing journals, and that a complete profile takes many factors into consideration, including an analysis of the regular columns and features, the *content* of the articles and the characteristics of the editors, the authors and the readers. That type of thorough analysis is beyond the scope of this thesis. However, I can make some observations based on the citation analysis. The following information is derived from Table 4, Table 5 and Table 9.

The Bulletin of the Association for Business Communication, as indicated by its title, does not consider itself a scholarly journal. ABC also publishes *The Journal of Business Communication*, which is considered the research organ of the association. *BABC* is a forum for shorter pieces, reports, news, and teaching exercises. Yet, many of the articles convey research results and scholarly models. The majority of articles have references, and the average number of references per article has increased from 2.8 in 1980 to 13.8 in 1990, a 393% increase. Its editor teaches in an English department. Its authors most frequently cite journals; 86% of their journal references are to other disciplines, and about half of those references are to business journals. When they do cite other core journals, they most often cite *JBC*. Newspapers and popular magazines are cited by authors in this journal more than in the other journals in the study.

The *IEEE Transactions on Professional Communication* is sometimes referred to as a practitioner journal. Members of the IEEE Professional Communication Society also belong to its parent organization, IEEE, The Institute of Electrical and Electronics Engineers. But the editor of this journal also teaches in an English department. The number of citations per article is close to the average for technical communication journals, increasing most dramatically (659%) from 2.2 in 1980 to 16.7 in 1990. Its authors cite books (50%) more often than journal articles (39%). Computer journals are cited more than those of any other discipline, followed by business and psychology. Significantly, engineering journals account for only 9% of the other-discipline references in this IEEE journal. Authors in this journal are more open to the technical and professional communication discipline than are those in the *BABC*, most frequently citing the journal *Technical Communication.*

In many ways, *Information Design Journal* (*ID*) is not a typical technical and professional communication journal, and should perhaps be excluded from the list of core journals as a result of this study. It is the only journal in the group to be published outside of the United States, and it does not cite any of the other core journals. It is cited one time each by the *IEEE Transactions* and the *Journal of Business and Technical Communication* and five times by *The Technical Writing Teacher*. In its citations per article (16.5) and its mix of journal references (36%) and book references (47%) it *is* similar to the others. It has the highest percentage of "other sources" references, most of which are technical reports.

Most of the other-discipline journals cited by *ID*'s authors are from engineering, followed by education and science. Because it deals with visual design rather than text, and because visual design is a recognized but under-researched area of technical communication (MacNealy, p.197), this journal should probably stay on the list of important journals for this discipline, but will probably continue to be cited more than it will cite the others.

The Journal of Business Communication (*JBC*) closely follows the profile of its ABC sibling *The Journal of the Association for Business Communication*, despite the fact that this editor teaches in a department of management science and statistics. The journals/books ratio is similar (53%/39%), and references to journals from other disciplines fall into the same subject categories as those of the *BABC* references.

However, in *JBC*, there is a much higher tendency of authors to cite earlier articles in the same journal, and a much higher citation-per-article count, the highest of any of the journals, in fact, at 38.3. Of this group of journals, it also had the most citations per article in 1980, at 8.7. In percentages, the increase in citations, 340%, is very close to that of *BABC* (393%). This indicates that the journals have maintained their separate roles through the decade, but both have become more scholarly in carrying them out.

In its frontal matter, *JBC* more than any of the other core journals spells out its audience, its objectives, and the types of articles and research methodologies that will be considered for publication. Its first objective is "to foster research and education in the communications of business, industry, government, and nonprofit organizations." The citation analysis shows that the authors draw on the resources of the disciplines of business, psychology, communication studies, English and sociology. They set themselves apart from authors in the other core journals by not citing any literature of computer science or engineering. This might indicate that at least during 1990, this journal did not cover technological aspects of professional communication.

The *Journal of Business and Technical Communication* (*JBTC*), the newest and smallest of the group, with a circulation of 339, may also be the most ambitious, in trying to cover both technical and business communication. Like *JBC*, *JBTC* also defines well its scope and its mission, which consists, in part, of "bridging dichotomies." It also asks its authors for "the highest standards of scholarship." The citation per article count, seen as one measure of scholarship, is high in this journal, at 27.4, second only to that of *JBC*. *JBTC* has the highest rate of openness to its own field, 28% (the group average is 13%), and the lowest rate of authors citing earlier articles in the same journal (due, probably, to its young age).

The journal most cited by *JBTC* authors is *The Journal of Technical Writing and Communication*, followed by *JBC* and *The Technical Writing Teacher*. The most frequently cited other-discipline journals are in the areas of communication studies, followed by English, psychology and business. However, many of its references are to books (53%) rather than to journal articles (40%).

The Journal of Technical Writing and Communication (*JTWC*) is a well-established and well-respected scholarly journal. Robert Connors refers to it as "a journal

which quickly became the most respected organ in the field of technical writing instruction" (p.347). Between 1980 and 1990 it more than doubled its citation per article count from 7.1 to 15.8, but its count is still below the average for the group (17.8), higher only than that of *BABC* and *Technical Communication*.

JTWC's openness to its own field is high (25%), and the number of references to previous articles in the same journal is average. This journal *received* more citations (40) from other core journals than do any of the other journals. The journals most cited by its authors are the *IEEE Transactions* and *The Technical Writing Teacher*. The other-discipline journal articles most often cited by its authors are largely in the area of English, followed by science and psychology. Business articles are seldom cited.

Technical Communication is by far the most widely read of all the technical and professional communication journals, with a circulation of 15,000. It is the only journal whose editor is not a university professor. Intended for members of STC, relatively few of whom are academics (12%), it is not considered a scholarly journal. The citation-per-article count would validate its "applied" label; in 1990 there are 10.3 citations per article, increasing from 7.1 in 1980. This is the lowest increase for any of the journals (45%); the average increase for the discipline is 207%. The authors in this journal cite books less frequently than do any of the other authors (28%), and they cite conference proceedings significantly more than do authors in any other journals (21% -- the next highest was 8% in the *IEEE Transactions*).

The number of times that *TC* authors cite earlier articles in the same journal is another significant departure from the norm, with thirty six percent of the journal references are to *TC* itself. The percentage of references to journals of other disciplines is the lowest of any of the core journals. There are few citations to other technical and professional communication journals. Occasionally cited are *JTWC* and the *IEEE Transactions*. It seems that *TC* authors do follow the journal's guidelines for authors, in which they are requested to "look over the literature of the field." The examples given are the very sources that these authors cite, with little exception. Of all the journals in the study, this one is the most self-contained. Still, a little more than half of the journal references are to other disciplines; business journals accounting for 40% of those citations and computer journals accounting for 24%.

The Technical Writing Teacher (TWT), now called *Technical Communication Quarterly*, "ranks only behind *JTWC* in the opinion of many technical writing teachers," according to Connors (p.347). In its count of citations per article (20.5) it is higher than *JTWC*, but in 1980 its count was lower (6.9). Connors wrote his assessment in 1982; perhaps *TWT* is ascending the scholarly scale. It is more open to its own field and to its own earlier articles. The technical and professional communication journals most frequently cited by its authors are *JTWC*, then the *IEEE Transactions* and *JBC*. The other subject journals most cited are in English (37%) and business (17%). Education, engineering and art journals are also cited several times. *College Composition and Communication* and *College English* together account for 29 of the 44 references to English journals.

Conclusions

Looking at this group of journals through their references will help define the individual journals and the discipline as a whole. As many observers have noted, the research base is small, the discipline is immature and not yet well defined (it is uncertain whether it ever will be). The scholarship as depicted by this citation analysis reveals that although academic programs in technical and professional communication are physically positioned in humanities units and less frequently in science or technology units, the research literature has a social science resemblance.

The interdisciplinary connections of this literature are to social science disciplines, with the exception of English and computer science. It should be noted that the most frequently cited English journals are those that cover *all* English scholarship, including technical and professional communication and composition studies as well as English pedagogy in general. Therefore, the articles from those journals cited in technical and professional communication journals are not truly "humanities" sources. The computer journals do not actually reflect computer science, but are those that cover user issues.

The subdisciplines of technical communication and business communication seem to survive somewhat separately, as indicated by the 1990 literature. In a discipline this small, similarities rather than differences should be emphasized, and the research bases consolidated, in order to avoid duplication of effort. The scholars may

be housed in quite different academic units, but they have information to share about workplace communication.

A more detailed analysis of this same data set would add depth to the study. One could explore the influences of individual authors, or individual journals in the more highly cited related disciplines. It might also be useful to analyse the dates of the cited works, to get a sense of how rapidly new information is incorporated and when information drops from current view. Information about the gender, institutional affiliation and academic rank of authors can also be derived from a study of journal articles.

This study could also be expanded to include data from other years. The citations-per-article information from the 1980 journals proved to be very useful in giving a sense of the development of the discipline.

Overall, the citation analysis reveals a discipline that is closer to the social sciences than to the humanities or sciences. Core journals are identifiable, but are not closely interrelated through their citations. However, there are similarities in the types of sources and the other disciplines that are cited in the core journals. The citations indicate that there are two distinct but not mutually exclusive subdisciplines, business communication and technical communication. The field as a whole is open to a variety of other disciplines. The vast increase in the number of citations per article in all the journals indicates that the research base is growing and that the authors are taking a more scholarly approach to their subjects.

Chapter Four

BIBLIOGRAPHIC PROBLEMS AND SOME SUGGESTIONS

I have looked at the technical and professional communication profession as it sees itself and as it is mirrored by the references in its journals. Some of that information will help to delineate some of the problems that librarians face in helping technical and professional communication scholars find the information they need.

In university libraries, librarians are often subject specialists, bringing to their work an academic background that allows them to build strong subject collections and guide users to the best sources. Subject specialists are linked to academic departments, and when a department is diverse, the librarian may not be equally comfortable with all elements. In other words, the library's English specialist may have a background in literature without a clue to the needs of the technical communication contingency. The problem could be the same if the program were housed in a college of engineering.

It is therefore essential for those few who understand both libraries and technical and professional communication to educate others about the literature of the discipline. It is also important for faculty in this discipline to understand something about libraries and bibliographic control, in order to work with the system and make their needs heard. Because the programs lack standardization, the needs will differ, but at almost every institution that has a technical and professional communication program, someone from the program needs to work with someone from the library to make sure that information is not only available but accessible to the students and faculty, and that the library understands the curriculum of this discipline. Usually, in libraries, "the squeaky wheel gets the grease."

Before discussing some of the ways to improve access to materials that support the technical and professional communication curriculum, I will explain some of the obstacles and discuss the strength and weaknesses of access tools.

Information Storage and Retrieval

Problems in bibliographic storage are a big cause of problems in information retrieval. Librarians and indexers assign the subject headings and terms that identify the contents of a book or article, and this is not always done satisfactorily, for various reasons. Librarians also assign the call number that will determine the physical location of the book. Even if the librarian who ordered the book knows what it is about, that is not usually the librarian who will catalog the book.

Books

Cataloging has been simplified a great deal through the use of computer networks. Before a book is published, or very shortly thereafter, it is usually cataloged at the Library of Congress (LC) by one of LC's huge cadre of subject specialists. The record becomes part of a national database, and when other libraries acquire the book, they do "copy cataloging," downloading the record into their own system. This leads to standardization of records, gets books on shelves sooner than if each book were subjected to "original cataloging," and saves libraries money because they can use staff people rather than professionals to do this. The average quality of catalog records is certainly improved by this method. However, that does not assure that every book is assigned the most appropriate call number or subject headings. The LC librarians must work within a classification system that dates back to the 1800's, and must assign terms from the *Library of Congress Subject Headings (LCSH)* thesaurus, which does change, but is problematic for any subject, especially for a new, indistinct discipline. And if the LC cataloger makes a mistake, it will be repeated in almost every library that owns the book. A book might be doomed to obscurity by one careless cataloger.

For example, an unfortunate classification error was made in a two-volume work, *The Technology of Text: Principles of Structuring, Designing, and Displaying Text*, edited by David H. Jonassen. The papers in these books represent research on textual communication, with an emphasis on instructional text. Electronic text is also discussed, but within a writing and designing context. In many library online catalogs, and in all card catalogs, the only access to a book is through its exact title, the author's name, and the assigned subject headings. When a book is cataloged, it can

be assigned as many as six subject headings. For these particular books, only one subject heading was designated — "information display systems." Figure 6 shows a page from the Library of Congress *Classification Tables, Technology* volume. Catalogers use this set of books when assigning a call number based on the book's subject matter.

ELECTRICAL ENGINEERING. ELECTRONICS. NUCLEAR ENGINEERING

TK

Electronics
Apparatus and materials
7872 Other, A-Z - Continued
.S8 Superconductors
.T7 Transformers
.V55 Voltage regulators
7874 Microelectronics
.5 Catalogs of microelectronic equipment
Microwaves
7876 General works
Amplifiers, see TK7871.2-58
Heating, see TK4601
Tubes, see TK7871.7-84
Waveguides, see TK7871.65
7878 Electronic measurements
.2 Time measurements
.4 Electronic instruments
Cf. TK301-396, Electric meters
.5 Auxiliary equipment
.6 Probes
.7 Cathode-ray oscillograph (Oscilloscope)
7879 Voltmeters
.2 Vacuum tube voltmeters
Applications of electronics
7880 General works
7881 Industrial electronics
Special applications
.2 Electronic control
.4 Sound systems (General)
Electroacoustics, see TK5981-5986
.6 Magnetic tape recorders and recording
Cf. TK5981-5986, Electroacoustics
.7 High fidelity systems
.8 Stereo high fidelity systems
.9 Theaters, auditoriums, etc.
7882 Other, A-Z
To be classified here unless otherwise provided for in the field of application
.E2 Eavesdropping
Facsimile transmission, see TK6710-6720
.I6 Information display systems
.M4 Metal detectors
Mobile communication systems, see TK6570.M6
.P7 Proximity detectors
.S3 Scanning systems
.S65 Speech processing systems

Library of Congress Classification Schedule

Figure 6

The call number assigned to this book begins with TK 7882, locating it with electronics books, near books on video display terminals, fax machines and metal detectors. In some libraries, the mistake will be caught, but in most others, the LC cataloging will be copied.

A graduate student interested in Blake soon learns the location of the Blake area of the British literature stacks. If a new collection of Blake works or a new book of Blake criticism arrives at the library, the browser will find it easily. A student of technical and professional communication or educational media design would probably never be browsing through the metal detector section of the electronics stacks. Typing the subject "Blake" into the computer or looking under "Blake" in the card catalog will retrieve a complete listing of books about him, but typing or looking under the phrase "textbook design" would not retrieve the Jonassen books, nor any other book, for that matter, since "textbook design" is not a valid Library of Congress subject heading. Access will be somewhat better in those libraries that offer keyword searching of terms in titles of books.

Edited books present another problem, as I pointed out in Chapter One. A subject heading must be broad enough to encompass all the contents of the book. The more diverse the subjects, the broader the subject headings will be. Important papers may therefore not be accessible either through a library catalog or through an index. Bibliographies sometimes include chapters in books, but often don't.

Journal Articles

Journal articles can be accessed in several ways; through browsing, indexes or abstracts, databases or bibliographies. Each discipline has its own best method of bibliographic control for its journal articles. In this discipline, scholars should use all possible approaches.

Indexes and Databases

Researchers and teachers who assign their students to use the library need to know which indexes and databases to use or recommend, and their limitations.

The student looking for journal articles on Blake would be referred to the *MLA International Bibliography* in its print form, on CD-ROM, or online, the *Humanities*

Index, also available on paper, computer disk or online, and the *Year's Work in English Studies* or *English Studies Abstracts.* Most of the literary journals would be indexed in one or more of these indexes, and articles on Blake would definitely be included. Thus, the student, the professor, and the librarian could be confident that by using these indexes, they would find just about everything published on Blake during a given period of time. Most librarians, however, would be at least temporarily stumped by a request for journal articles on design elements for desktop publishing or protocol analysis for usability testing.

Scholars and librarians need to broaden their scope when choosing indexes for technical and professional communication topics. When biology students need an index, they are directed to biology indexes, and all students from the English department regardless of their specialty may be sent, inappropriately in some cases, to English indexes, most of which are restricted to literary topics. Technical communication students might use the indexes of education, psychology, business, science, linguistics, library science, or communication studies.

In using an index or database of a foreign discipline, it is important to realize the limitations of indexing terminology. Like the librarians who must assign Library of Congress subject headings to books, indexers are generally required to use a thesaurus of approved terms. Also important to keep in mind is that terms used to describe a concept will differ among disciplines. For example, the word "documentation" in information science has meanings very different from the way it is used by technical and professional communicators, as in "computer systems documentation." Someone with an English background searching a psychology database for articles on the usability of computer system documentation might not realize that some cognitive psychologists refer to a user model as a "production system" (Polson, p.188). Furthermore, each discipline has its own approach to a subject, and an index may not include an article that takes a more multidisciplinary approach, even if the article is in a journal that the index includes.

In "The Inadequacy of Interdisciplinary Subject Retrieval," Trudy Gardner and Mary Lou Goodyear report on their study of the interdisciplinary coverage of the subjects "death" and "abortion" in four major indexes. They found that the four indexes stuck rigidly to their own disciplines' coverage; for example, *Index Medicus*

covered only the physiological aspects. They conclude that "it is difficult for people in one discipline to locate information through the indexes of another discipline" (pp.193-4).

Even an index intended to cover a focused discipline can be highly selective in its coverage of the core journals, as Albert LaRose found when examining one year's coverage of *Communication Abstracts*. He found that "the most frequently cited journal, *Journalism Quarterly,* was cited nearly four times as frequently as the runner-up, *Journal of Advertising* (123 vs. 32 citations)." The *Quarterly Journal of Speech* and the *Journal of Nonverbal Behavior* were cited only once (p.29). LaRose felt that the coverage of core journals was very uneven.

LaRose then compiled a list of core communication journals and a list of the indexes that included them, according to *Ulrich's International Periodicals Directory* and the source lists of the indexes themselves. He found that in all indexes, the coverage was highly selective, and that in many there was no coverage of some of the journals listed in the source list for the index. He cautioned librarians against referring communication arts students to *Communication Abstracts* as the best source for articles on their subjects. Only 34.1% of articles in core journals were covered there. The index that gave the best coverage, *Current Index to Journals in Education,* covered only 50% of the articles in the core journals. A good number of the articles (36.2%) are included in neither of these indexes. One fourth of the articles in core communication journals were not covered in any of the indexes LaRose studied. He suggested that since total bibliographic control was not provided by indexing and abstracting services, librarians should instruct their patrons to browse appropriate journals and use bibliographies and citation indexes in addition to the indexes (LaRose, p.31).

For some of the core journals identified in Chapter Two, I also found that there are cases in which an index that is listed in the *Ulrich's* entry for a journal does not include that journal in its source list. In the *Ulrich's* entry for *Information Design Journal*, several indexes are listed, including *Business Periodicals Index, CIJE, ERIC, Communication Abstracts,* and *ABI/Inform.* It appears that none of these indexes actually includes this journal in its coverage. I also found that an index will include a journal in its source list but will not actually have any entries for that jour-

nal. For example, *The Bulletin of the Association for Business Communication* is listed in the *ABI/Inform* database list of included journals, but a search finds no articles from this journal. *Technical Communication* is included in *ERIC*, but a search shows that only 13 articles are indexed, and that 12 of these are from the May 1988 issue.

However, unlike LaRose, I found when I searched the CD-ROM databases *ABI/Inform*, *Compendex*, and *ERIC* that in most cases when a journal is covered, it is covered thoroughly (see Table 14).

Table 14

Inclusion of Journal Articles in CD-ROM Databases

Journal	*ABI/Inform*	*Compendex*	*ERIC*
BABC	—	—	95%
ID	—	—	—
IEEE	87%	100%	—
JBC	90%	—	75%
JBTC	—	—	100%
JTWC	—	—	95%
TC	—	—	—
TWT	—	—	100%

Of all the indexes that *Ulrich's* lists for the core journals, *ERIC* and *CIJE* (the same database, in different formats) gives by far the best coverage to the most journals. Only *Information Design Journal*, the *IEEE Transactions on Professional*

Communication and *Technical Communication* are not covered here. When the decisions were made to include the other journals, it was probably felt that they had a strong relevance to teaching. Of the four 1990 articles from *The Journal of Business Communication* that are not indexed in *ERIC*, two are included in *ABI/Inform*. One is a management study of effective listeners and the other is about communication strategies. Two articles in the journal are not included in either database: "Response to Johan Van Hoorde," a four-page article with one reference and "Beyond a Concept of a Communication Process," an 11-page article with six references. We would probably need more data to draw conclusions about the indexing criteria in *ABI* and *ERIC*, but it is possible that highly theoretical articles are excluded from both. *ABI* included all the other articles in *JBC* and 87% of the articles in the *IEEE Transactions*, but does not cover any of the other core journals, even though there *is* a journal code for *The Bulletin of the Association for Business Communication*. *Compendex*, the electronic equivalent of the *Engineering Index*, gives complete coverage to the *IEEE Transactions*, even to the short commentaries and teaching exercises; it is no surprise that the other core journals are not included.

Only articles on certain subjects in certain types of periodicals are accessible through library indexes and databases. Most articles on technical and professional communication pedagogy can be easily retrieved using *ERIC*, the *Current Index to Journals in Education* (*CIJE*), or the *Education Index*. Articles that have to do with business writing could be found using *ABI/Inform* (online or CD) or the *Business Periodicals Index*, but only if the articles are in business periodicals, *The Journal of Business Communication*, or the *IEEE Transactions*. But articles that are not in these specific journals or in business or engineering journals will be difficult to retrieve through an index. The interdisciplinary nature of subjects like document design or discourse communities and the theoretical nature of rhetorical theory means that journal articles on those subjects *might* be listed in indexes of other disciplines, or they might not be listed anywhere.

Browsing

As shown in Chapter Two, the number of core journals for this discipline is small. Any university that has a graduate program in technical and professional communication should probably have all of them in its library, although many librar-

ies may not. Again, the discipline suffers for its young age; at this time, as serial prices skyrocket and library budgets shrink, many libraries are not able to add even the journals badly needed for new programs.

Because it takes time to scan through every issue of several core journals, the browser may wish to be selective, choosing those journals that are poorly indexed, or those journals likely to cover subjects that are poorly indexed. As we have seen, pedagogy is well indexed, as are some aspects of business communication. *IEEE* can be easily accessed in engineering databases. *Technical Communication, Information Design Journal* and the *Journal of Business and Technical Communication* are not well indexed, so should be scanned.

Browsing as the main access to periodical articles would be unsatisfactory in this discipline, as shown by the citation analysis in Chapter Two. In the 1990 issues of the core journals, citations to the core journals themselves comprised only 11% of the total citations. This is due to the interdisciplinary nature of the field, and its openness to outside influences.

Bibliographies

Bibliographies can help fill in the gaps left by indexes and Library of Congress cataloging in covering the literature of technical and professional communication. Several general and specialized bibliographies have been compiled for this discipline, and they should be widely promoted as access tools to this elusive literature, especially to the interdisciplinary aspects. Patrick Scott discusses at length the role of bibliographies in composition studies. Some of his concerns will apply to the bibliographies of technical and professional communication as well. He points out that the compiler influences the scope and coverage as well as the shape of the bibliography. He is concerned that "A selected bibliography, through its taxonomy, channels the user into a particular research tradition or phase of a continuing debate" (p. 176). Ideally, he says, a discipline has one main professional association that defines the field. When there are many groups, each one has its own terminology, emphasis, and concerns. This fragmentation can limit a bibliography. He also notes that usually, selective bibliographies only include research. "By excluding non-empirical works from bibliographic control, solid research will stand out more clearly, but there will a

possible bias." And sometimes researchers, especially new ones, need to find other kinds of information, including background sources and general discussion (Scott p.171).

Bibliographies can either be published as monographs or in periodicals. In a journal, a review article, annotated bibliography or regular listing will either cover a limited subject or a limited time period. *Technical Communication* has a regular column, "Recent and Relevant" that is actually a selected annotated bibliography of recent books and journal articles. The comprehensive but not annotated annual *ATTW Bibliography* has appeared regularly in the fall issue of *Technical Communication Quarterly* (formerly *The Technical Writing Teacher*) and covers the preceding year. This bibliography is classified by subject and includes books, reviews and journal articles. The journals that are canvassed for this bibliography include not only the core journals and the general English journals, but also several from other disciplines such as communication studies, educational technology, physics and nursing. *The Journal of Technical Writing and Communication* features a retrospective annotated bibliography of its articles from 1971 through 1989 (volume 20(1), 1990), also classified by subject.

Bibliographies in book form can be more comprehensive in scope and more generous in their annotations. In addition to classification by subject, a monographic bibliography can offer a keyword index, giving the user many more access points. A drawback to the monograph is its lack of currency. As an access tool for finding recent information, a monographic bibliography is almost out of date as soon as it is published. But it can provide broad and thorough access to more seasoned literature. The following is a list of some of the important bibliographies that every library supporting a graduate program in technical and professional communication should have:

Moran, Michael G. and Debra Journet (eds.). *Research in Technical Communication: A Bibliographic Sourcebook*. Westport, CT: Greenwood, 1985.

Sides, Charles (ed.). *Technical and Business Communication: Bibliographic Essays for Teachers and Corporate Trainers*. Urbana, IL: National Council of Teachers of English; Washington, DC: Society for Technical Communication, 1989.

Hull, Debra L. *Business and Technical Communication: A Bibliography, 1975-1985*. Metuchen, NJ: Scarecrow, 1987.

Recommendations

Because each technical and professional communication program is different, I can offer no detailed prescription for making sure that students will find the information they need to support their coursework. In general, though, I can make a few recommendations. First, good communication between teaching faculty and librarians is very important. The library should understand the program, and the program should understand the library. Those who have learned to navigate in the library should share their knowledge with their colleagues as well as with their students. Librarians knowledgeable in this discipline should also share what they have learned with their library colleagues.

When a new graduate program is in the planning stages, library resources should be considered. The library may not be able to add the required new materials. If possible, funding should be found elsewhere. This would assure that the library would respond favorably to future needs as the program grows.

Improving Access to Information

Improving access to information includes both making the information available in the library and making sure that it can be found once it's there.

Books

Because the library's subject specialist in English (or engineering, or whatever department houses the program) probably doesn't have a background in technical and professional communication, faculty members should not totally leave the ordering of books up to the library. The responsible librarian would probably be grateful for suggestions of books to be ordered.

If the library uses an approval plan (vendors automatically send books that fit a computerized profile), make sure that the profile is broad enough to support all aspects of the curriculum.

It is worth the time spent to scan the book reviews in the journals that most closely relate to a particular curriculum. Librarians often monitor only the library-oriented reviewing periodicals such as *Choice* and *American Reference Books Annual (ARBA)*, and the books of interest to a technical and professional communication program might fall between the cracks of the disciplinary classification system those periodicals use.

As faculty members become aware of new or potentially useful books that the library might buy or might already own, they should add the titles to a lists or personal databases. Some of those books might be difficult for students to find in a subject search of the library's catalog. Faculty should make an extra effort to be accurate in listing a book's title and author or editor. Students and librarians become frustrated and resentful trying to find a book using a professor's botched citation.If an edited book has useful individual chapters on diverse subjects, the chapters should be included on lists of library resources, but the title of the *book* should be made clear. It cannot be assumed that all graduate students know how to read a bibliography.

For this discipline a book list on a syllabus can be extremely helpful. One can look up the especially relevant titles in the library catalog to see what subject headings have been assigned and then share this information. Students should also be encouraged to use this technique of using a book they have found to lead them to other related books.

It is important for teachers to understand the Library of Congress classification system and share that knowledge with students. They should be told that unfortunately, the books they need will be scattered in various areas. They can learn where some of those areas are, but it will be more effective for them to become expert users of the library's catalog, whether it is on cards or online.

Students should be taught the value of references in journal articles. As shown in the citation analysis, books and chapters make up 42% of the 1990 references in core journals.

Those who write books should make sure that the title accurately describes the subject of the book and that the introduction also makes the subject clear. The title and introduction may be all that the book's cataloger will look at. More people will

read the book if it is shelved near related books and if its subject headings are reasonably accurate. Words in the title will be the access points for some future searchers.

Periodicals

If a library in an institution that houses a technical and professional communication program does not subscribe to the core journals listed in Chapter Two, they should be added if at all possible. Even if everyoneteaching in the program receives a personal copy of a journal published by an association they all belong to, students need access too. Faculty collections or informal departmental libraries might provide some access to some students, but the library is best at providing access to all, and is usually open at night.

If the library is unable to add new journals, technical and professional communication faculty should negotiate with the parent department to drop some subscriptions in favor of adding the journals they need. If literature enrollment in an English department is shrinking and technical and professional communication enrollment is increasing, the library's journal subscriptions should reflect that.

Faculty and graduate students should regularly browse through the core journals that they don't subscribe to themselves. They should know the journals from other disciplines that are most likely to cover subjects that support their curriculum.

Some journals have an annual index. *Technical Communication*, for example, has a classified subject index that appears in the February issue and covers the preceding year. Bibliographies in the core journals, such as the *ATTW Bibliography* are very important. As individuals' research interests change, they may need to be reminded of an article that was skipped when it first appeared.

A wide variety of indexes should be used to approach most subjects in technical and professional communication. Librarians can suggest appropriate indexes. In an unfamiliar index or databases has print or online thesaurus, it can lead the user to the controlled vocabulary terms that may be idiosyncratic to the particular discipline indexed. If an index has both a subject classification and a keyword index, both approaches can be useful.

Citation indexes offer yet another approach. A good article or author on a subject can lead the researcher to other articles in which it is cited. This is one way to explore a research network.

Those writing journal articles should keep in mind the segment of potential readers that will be using library tools to find the article. Here again it is important to pay close attention to the title, the words in the abstract, and the keywords that might be assigned by an indexer based on the title, abstract, and opening remarks (see Curtis and Bernhardt for more discussion).

Bibliographies

Students should be encouraged to use both specialized and general bibliographies. They should be listed on syllabi and on lists of library resources.

After doing a thorough literature review to support a research article, the author should think about the possibility of creating an annotated bibliography on the specific subject, for publication. It would not necessarily duplicate the review, because it would include sources that found but not used. Pulling the bibliography together might allow a graduate assistant the opportunity for co-authorship.

In updating a previous bibliography, it is essential to think about improving access to older information by adding subject terms that reflect the discipline's evolving paradigms. New terms can also be applied to books and articles that were written before the term was coined. Scott feels that this is important; he says that bibliographies should be "comprehensive repositories of record as well as short-term retrieval tools" (p.175).

Bibliographic Instruction

For undergraduate students, who might be using the library on an occasional basis, a general orientation to the library would suffice. The instructor should then give very specific help in tracking down interdisciplinary information. The students should have positive first experiences in the library, and instructors should acknowledge the difficulties in retrieval of certain kinds of information. When students return to class complaining that there is no information in the library on their subjects, they

should be told (kindly) that the information is there, but it is not their fault they couldn't find it. They should be offered specific suggestions and be encouraged to consult a librarian, giving the librarian as much information as they can about their topics and their approaches.

Graduate students are generally expected to familiarize themselves with the library. While it is true that the best way to learn about a library is to use it, instructors should understand that in this discipline, guideposts are essential.

As early as possible in students' graduate study of technical and professional communication, they should receive elaborate bibliographic instruction. If there is a librarian who is knowledgeable about the curriculum and the resources, it would be very useful to have him or her speak to an introductory class, preferably more than once. If there is not a librarian who has a strong rapport with the program, it would probably be preferable for the informed instructor to perform this role.

Patrick Scott's comments about composition students could apply equally to students of technical and professional communication:

> Those committing themselves to composition as a graduate field need systematic instruction in its special bibliographic difficulties. It is not enough to hand students the Tate book, or even Moran and Lunsford, and point them towards an ERIC terminal...Changes in research focus, and the explosion of published work on composition have complicated, and perhaps temporarily disrupted, any easy information retrieval in the field (Scott, p. 176).

A popular assignment is to have students, individually or in groups, compile an annotated bibliography of the major library resources in the discipline. The first-hand discovery and even the false starts can be immensely helpful, but instructors of technical and professional communication should realize that for their students, this might be a frustrating and difficult or even unsuccessful exercise. Without the sustained involvement of a knowledgeable librarian or library-literate instructor, inexperienced students will not uncover the search strategies they will need. If their results are passed on to other students through a presentation, misinformation may multiply. For example, a group of students who completed such an assignment in my library defined the card catalog thus: "Contains a few books and articles on technical writing but is limited, scant and not very informative." First of all, the card catalog does not

include articles. Furthermore, the important thing to know about that particular card catalog is that it was closed in 1975, and does not have any cards for books received since then. The students apparently did not discover that important clue on their own.

Given the difficulties of bibliographic control, instructors might be tempted to avoid the library and rely on textbooks, reserve readings, and photocopied packets. But that is doing students a disservice. Not only should education include seeking one's own knowledge independent of the instructor, but it should include developing one's skills in information retrieval. If the chosen subject of study requires complex retrieval skills, then it will simply require more time and more help in learning them.

If technical and professional communication students do not become comfortable in the library while in college, they may not use libraries after they leave. As we have seen in Chapter One, the profession is rapidly evolving and the job responsibilities of graduates are expanding. Information retrieval is not only an academic skill, but for these students a job skill as well. It is the responsibility of their teachers to help them acquire it.

It is also the responsibility of both those who create and those who organize and provide access to the literature of technical and professional communication to make sure that the research base builds upon itself and that bibliographic control becomes recognized as an important research issue within the discipline. I have outlined some problems and some ways to deal with them, but long-term solutions are not yet apparent. It is important for this discussion to continue.

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